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Educational Television Series 1968-69

Teachers' Guide

DEPT. OF EDUCATION
HISTORICAL COLLECTION

Mathematics

INTERMEDIATE DIVISION

Educational Television Branch
ONTARIO DEPARTMENT OF EDUCATION
1670 Bayview Avenue, Toronto 17

MATHEMATICS
Intermediate Division

8 programs of 20 minutes each.

General Introduction

Program One
Slide Rule

Program Two
Newton's Method – Square Roots of Whole Numbers

Program Three
So You Want To Buy a Car

Program Four
Similar Triangles – Applications

Program Five
Trigonometry: Applications

Program Six
Graphs

Program Seven
Direct Variation

Program Eight
Inverse Variation

Please address your comments and questions on this series to:

Assistant Superintendent,
Mathematics and Science,
Education Section,
E T V Branch,
1670 Bayview Avenue
Toronto 17.

INTRODUCTION

This series of eight programs is based on the courses of study for Grades 9 and 10 four year program (Mathematics Curriculum I. 12C, I. 12D). The suggested grade levels for each program are as follows:

Program one
– grade 10

Program two
– grade 9 (suitable for grade 10 review)

Program three
– grade 10

Program four
– grade 9 (suitable for grade 10 review)

Program five
– grade 10

Program six
– grade 9 (suitable for grade 10 review)

Program seven
– grade 10

Program eight
– grade 10

The programs are intended to complement the classroom work on these topics. Where possible, simple practical applications suitable to the topic are introduced. Models and animation are used to simplify the presentation of these mathematical topics. References are made to the historical developments of these topics. Each program could be used as follows: *one class period* for the film and subsequent discussion and *one period* allocated for the post-viewing activities suggested after each program. It is essential that students be equipped with writing material to note any difficulties or points of interest during the program. The series as a whole is attempting to use the medium of television to stimulate general interest in mathematics.

PROGRAM 1

SLIDE RULE

The aim of the program is to introduce the need for a slide rule, and to acquaint the student with some aspects of its operation. (Curriculum 1.12D, Unit 1, Section 2., Four year).

PROGRAM CONTENT

Man has devised many types of mechanical devices to aid his arithmetical computations, each with particular features. The slide rule is one of these devices and is a convenient aid to calculation in many industrial and business situations. The principles involved in constructing a slide rule are examined by considering an addition slide rule. The meaning of slide is seen and the necessity for scales on the slide rule is introduced. A multiplication slide rule is then seen and the problems in making it are considered, e.g. the product of some numbers cannot be determined on this multiplication rule. The question is then raised as to how a slide rule can be constructed to overcome this problem. The examples used are deliberately made simple. The question of accuracy on the slide rule is considered and the use of other more accurate devices is noted, e.g. 10-key calculator, computer.

SUGGESTED PRE-VIEWING ACTIVITIES:

Familiarity with the terms rounding off, estimating, quotient, identity, scales, decimal, inverse operation is required in order to use the program to its fullest advantage. Since the program does not attempt to teach the slide rule in detail the following questions could be used as a preparation for the telecast:

1. Discuss how two rulers could be used to perform the operations of addition or subtraction. How could we add 250 and 450 with them?

2. Determine what mechanical devices are available to man to aid his computations, e.g. cash register, calculator, abacus, computer. Establish business or industrial situations where a computing device is necessary, e.g. a computer is used to control traffic in some large cities; most stores require a cash register; the abacus is still used in some countries.

3. For the following examples determine a computing device that would be useful – orbitting satellites, credit cards, payrolls of large companies, weather forecasting.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.

2. Build slide rules to accommodate operations for addition, subtraction, multiplication, and division. It is possible to build a slide rule which accomodates all these operations?

3. What materials should be used to make a slide rule and why?

4. Name some other computing devices, and where they are used.

5. List a number of businesses and determine what computing devices are used by these companies to save time.

6. In what occupations would it be useful to know how to operate a slide rule?

REFERENCES

Computing Devices: Exploring Mathematics on Your Own: Webster Co.

Short Cuts in Computing: Exploring Mathematics On Your Own: Webster Co.

We Built Our Own Computers: School Mathematics Project Handbook. Cambridge Press (MacMillan of Canada).

PROGRAM 2

NEWTON'S METHOD – SQUARE ROOTS OF WHOLE NUMBERS

The aims of the program are to introduce the method of Newton to determine square roots of whole numbers and to illustrate practical situations that require this method.

PROGRAM CONTENT

The program begins with a sequence of situations in science which illustrate the necessity of deriving square roots.

e.g. $T = 2\pi\sqrt{\frac{L}{g}}$, $V = \sqrt{2gh}$

A historical reference is made to the

development of triangular and square numbers by the Greeks and Arabs. The meaning of radical is briefly reviewed.

To introduce Newton's method of determining $\sqrt{13}$, a student is given the problem of constructing a square mosaic on plywood using $\sqrt{13}$ square feet of mosaics. By determining the sides of the required square, he develops Newton's method to determine a value for $\sqrt{13}$. The successive approximations to the value of $\sqrt{13}$ are obtained. Other applications are noted. The range of a television transmitter is essentially related to the square root of its height. The range of a TV tower 735 feet high, is obtained. Using a desk calculator, the student solves the problem. The program closes with a description of how a computer can determine the value of square roots.

SUGGESTED PRE-VIEWING ACTIVITIES

1. Review problems that involve square roots, e.g. $A = s^2$. A, area of square; s, side.
2. Review the Greek development of triangular and square numbers, e.g.:
   (i) 3 is a triangular number
   (ii) 4 is a square number.
3. Review square roots of whole numbers by estimation and by factoring, e.g.:
   (i) 735 (ii) 81.
4. Discuss the factors that influence the horizon distance, e.g. view from fire tower, beam from light house.
5. Discuss mechanical devices used for computation, e.g. desk calculator, computer, slide rule.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.
2. A project could be assigned to examine the following:
   (i) the binary system and the computer,
   (ii) the programming of a computer,
   (iii) the method a computer uses to determine the decimal approximation of square roots,
   (iv) the advantages of using a computer to solve problems with square roots.
3. The following could be investigated:
   (i) When consecutive natural numbers are added, the sums obtained represent the triangular numbers, 1, 3, 6, 10 . . .
   (ii) When consecutive odd numbers are added, the sums obtained represent the square numbers, 1, 4, 9, 16 . . .
4. Determine problems in which it is necessary to compute decimal approximations of square roots, e.g. if an object is dropped vertically and falls freely, the relation between the time it takes the object to fall, t seconds, and the distance it falls, d feet, is $t = \frac{1}{4}\sqrt{d}$
5. Use Newton's method to determine decimal approximations to one decimal place for each of the following:
   (i) $\sqrt{3}$ (1.7)
   (ii) $\sqrt{121}$ (11)
   (iii) $\sqrt{23.2}$ (4.8)

REFERENCES

FIELKER, D. S., *Computers,* Cambridge (MacMillan Co.)

LAND, FRANK, *The Language of Mathematics,* Longmans of Canada.

PROGRAM 3

SO YOU WANT TO BUY A CAR

The aim of the program is to introduce and compare some different methods to borrow money for purchasing personal property as outlined in Curriculum 1 12D, Unit 4 and 6 (Grade 10).

PROGRAM CONTENT

The purchase of a car represents a large investment for an individual. John Kastner decides to buy a *used* car. In discussing his purchase with the used car salesman, he notes that a certificate of mechanical fitness will be given with his purchase. John does not have the money to pay cash for the car so he must arrange to finance it. Normally the dealer would arrange the credit through an acceptance corporation, but John investigates other sources for money.

At the finance company, the manager explains what arrangements must be made in order to obtain a loan. After they discuss the details of the loan, John decides to think it over carefully before he signs on the dotted line. In a similar way the bank manager outlines the necessary steps to obtain a loan from the bank. Some comparisons and differences are noted between these two types of loans. John investigates an alternative method to obtain a loan. At the credit union, the method of obtaining a membership is described. The details of a loan are again described. Through his discussions, John finds out that financing a loan is not the only expense required in purchasing a car. An insurance agent outlines the types of insurance required to protect the owner of a car. The program closes as John discovers that there are many other expenses in owning a car: repairs, maintenance, operating expenses, depreciation, to name a few.

SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the terms: cash purchase, finance company, credit union, is required in order to use the program to its fullest advantage. Some discussion on the questions found in the post-viewing activities would also be helpful. The following could be used as a preparation for the telecast:

1. Discuss the need in some cases to borrow money.
2. Discuss whether a car is a luxury or a necessity.
3. Discuss the advantages and disadvantages of purchasing a used car rather than a new car.
4. Discuss what sources for credit are available in purchasing personal property.
5. Compare a cash purchase and a credit purchase.

SUGGESTED POST-VIEWING ACTIVITIES

1. Suggest points of interest in the program and clarify difficulties arising from it.
2. Discuss the different forms of credit borrowing: bank, finance company, credit union. What other sources of money are available? What are the advantages and disadvantages of each of the above type of loans?
3. Determine a list of items that should be checked before the purchase of a used car is finalized.
4. Discuss the use of the formula to compare the effective interest rates for different loans (Curr. 1 12D, Four year program, Unit 4, page 5).
5. Discuss the following terms: certificate of mechanical fitness, offer to purchase, down payment, chattel mortgage, credit application, co-signer, contract, credit rating, credit union rebate, public liability insurance, property damage insurance, sales tax, transfer of licence.
6. What are the expenses in owning a car? Discuss the following:
   - insurance: coverage for public liability, and public damage, fire, theft, and collision.
   - repairs: prepare a list of repairs and expenses that might be required for a car over a period of five years e.g. tune-up, muffler, brake lining etc.
   - for the above, determine the cost of operating a car per mile driven.
7. What are the age requirements in borrowing money? Why is there a difference in the rates of insurance for car owners, i.e. a driver under 25 years of age; a married driver. What are the minimum insurance requirements on a car? What happens when we miss payments on a loan?

REFERENCES

FLOHERTY, *Money-Go-Round,* Lippincott Co.

LEONHARDY, *Mathematics for Everyday Living,* D. Nostrand Co.

PROGRAM 4

SIMILAR TRIANGLES – APPLICATIONS

The aims of the program are to introduce the use of similar triangles to solve simple problems in the students' environment and to illustrate practical applications of the properties of similar triangles.

PROGRAM CONTENT

The program opens with a brief sequence of similar figures and quickly reviews the properties of similar triangles. As the first application of similar triangles to indirect measurement, two boys determine the height of a flagpole by using shadows. As the next example, the boys measure the width of a stream by marking out similar triangles on the ground. The diagram is developed in detail and the width of the stream is obtained.

The problem of determining distances accurately is often a problem of measuring angles accurately. For this reason, the transit is introduced as a device required to measure the length of the next distance. Some of the essential features of the transit are seen. The properties of similar triangles are required in the study of optical instruments. The program closes with a brief look at the slide projector.

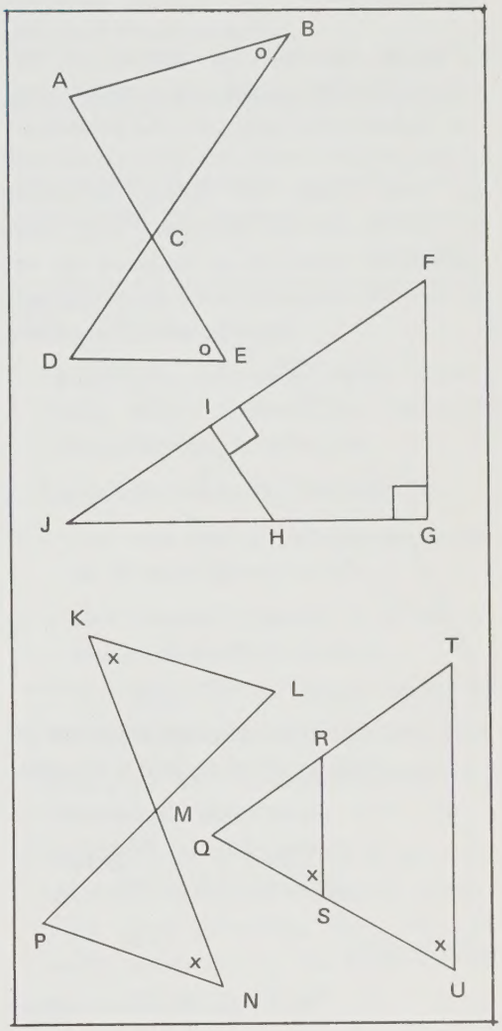
SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the properties of similar triangles is required in order to use the program to its fullest advantage. The following questions could be used as a preparation for the telecast.

1. Discuss the properties of similar figures. Are all similar triangles congruent? Are all congruent triangles similar?
2. Discuss how the properties of similar triangles could be used to find the length of inaccessible distances, e.g. height of flagpole, width of wide stream.
3. Review the solution of the following:

   (i) $\frac{h}{5} = \frac{12}{2}$ (ii) $\frac{x}{5} = \frac{34}{20}$ (iii) $\frac{d}{42} = \frac{15}{9}$

4. Identify the similar triangles in the following diagrams:



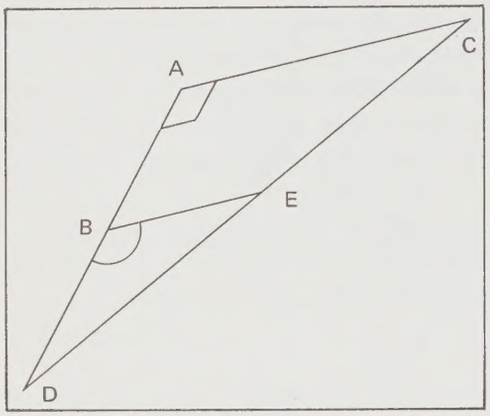
SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.
2. Apply the indirect methods used on the program to measure the length of inaccessible distances about the school, e.g.:
   (i) The use of shadows and similar triangles could be used by the students to measure the height of a telephone pole.
   (ii) Why are the triangles obtained in (i) similar?
   (iii) Discuss why different answers can be obtained by the students in (i).
3. Groups of students could be assigned the problems of measuring the width of a road, or the length of the school

yard by using the method on the program to measure the width of the stream.

4. Discuss the essential features of the transit (scale, plumb bob,) and its use in determining data to solve problems.

5. The following diagram is used on the program to measure an inaccessible distance.



   (i) Discuss the possible problems in which the diagram could be used.

   (ii) The students could determine appropriate data for (i) and solve the consequent problem.

REFERENCES

LAND, FRANK, *The Language of Mathematics,* Longmans of Canada.

PROGRAM 5

TRIGONOMETRY: APPLICATIONS

The aims of the program are to illustrate practical situations in which trigonometry is required to solve them and to describe the transit and gravity protractor.

PROGRAM CONTENT

The program begins with film footage from the movie "Dambusters". In the second World War, Lancaster bombers were attempting to destroy the huge dams that supplied power to the Ruhr industries in Germany. In order to successfully achieve this, the bombers were to fly at precisely 60 feet above the surface of the water. The application of trigonometry to determine this height is shown in detail.

A further application of trigonometry involving the height of the Burlington Skyway Bridge connecting Hamilton Bay and Lake Ontario is described. The program continues as two students are assigned the problem of determining the height of a high tower. A gravity protractor is built and used to measure the required vertical angle to solve this problem. Since this method of measuring the vertical angle is not accurate, the transit is introduced in a further problem involving the height of a cliff. The two devices are essentially based on the same principle. The program closes with a further problem which requires the measurement of horizontal angles and an inaccessible distance.

SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the terms, vertical and horizontal angles, angles of elevation and depression, protractor, plumb bob, and the use of trigonometric tables is required in order to use the program to its fullest advantage. The following questions could be used as a preparation for the telecast.

1. Review the definitions of sin A, cos A, tan A, where A is on angle. No attempt is made on the program to teach them.

2. Discuss what minimum information is required in order to solve a practical problem involving right-angled triangles.

3. Review the solutions of the following:

   (i) Find the value of tan 70^{o}, sin 2^{o}, cos 27^{o}, tan 62^{o} to three decimal places.

   (ii) Determine the value of the unknown:

   $\tan A = \frac{60}{32}$ $\quad \frac{h}{4000} = \sin 2^{o}$

   $h = 420 \cos 27^{o}$

4. Discuss methods to measure the value of angles in degrees and minutes.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it:

   (i) the determination of the height of the Lancaster bombers as 60 feet,

   (ii) the measurement of clear passage height under bridges (Burlington Skyway Bridge).

2. Discuss the construction and operation of a gravity protractor to measure the angles of elevation, and of a comparable device to measure horizontal angles.

3. Compare the transit and gravity protractor as devices to measure angles.

4. Identify inaccessible distances in the environment which can be measured using trigonometry. Discuss the minimum information required to solve each problem:

   (i) height of trees, poles, buildings, silos, cliffs,

   (ii) width of streams, valleys, school courts, ponds, marshland, farmland, swimming pools.

5. As a project, determine other applications of trigonometry, e.g. in the study of sound, radar, electricity, vibrations, etc.

PROGRAM 6

GRAPHS

The aims of the program are to introduce some aspects of graphing as outlined in curriculum 1 12C, Unit 9 and to relate where possible the use of graphs in practical situations.

PROGRAM CONTENT

The program begins with the question, "How does man locate positions on the earth's surface?" The use of a road map to simplify the location of cities and towns is described. This method is then compared to the use of E/W and N/S directions to locate positions. The comparison of this grid system to locate positions and the Cartesian co-ordinate system is introduced. The terminology required for graphing is briefly indicated. Reference is made to the use of ordered pairs to describe a race by Bill Crothers, famous Canadian half-miler. A graph is constructed of the race and then analyzed.

A number of experiments are illustrated to introduce the notions of linear and non-linear graphs. An analysis of the results illustrates the usefulness of a graph to convey visually a great deal of information. The application of these methods to various situations are seen, e.g. weather forecasting, business, medicine, science. The program ends with a reference to the use of the computer to analyze and interpret data and to draw their graphs.

SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the terms: ordered pair, axis, first and second co-ordinate, plotting points is required in order to use the program to its fullest advantage. The following questions could be used as a preparation for the telecast:

1. Review the use of latitude and longitude in determining positions on the earth's surface.
2. Determine ways by which positions in the province or in a city could be established. Examine the method used in maps to approximately locate positions.
3. Discuss methods by which great amounts of data could be simplified, e.g. the use of bar graphs to simplify statistics.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.
2. Discuss the use of E/W and N/S axes to establish position within the school grounds or in the classroom.
3. Discuss the significance of the order in an ordered pair.
4. What was the contribution of René Descartes in determining position in a plane? Discuss any other mathematical terms that have been derived from a mathematician's name, e.g. Cartesian from Descartes.
5. Discuss real life situations where the use of graphs is required to simplify data.
6. Compare the different climates for different regions from their corresponding weather profiles.
7. The students could experiment with differently-shaped containers to obtain a relationship between the height of the water in the container and the time that has elapsed.

REFERENCES

REYNOLDS, J.A.C., *Shape Size and Place;* Contemporary School Mathematics, MacMillan Co.

Adventures in Graphing: Exploring Mathematics on Your Own, Webster Co.

PROGRAM 7

DIRECT VARIATION

The aims of the program are to introduce some aspects of direct variation (Curr. 1 12D, Unit 5, Sec. 3, 5) and to illustrate practical examples related to the students' experiences.

PROGRAM CONTENT

The program begins with a look at quantities which are measurable. Changes that occur in one variable may be related to changes that occur in another variable. The distance travelled by a cyclist is related to the number of turns of the foot pedal. This example is considered in detail and the notion of direct variation is introduced. The expression "d" varies directly as "n" and the use of the symbol " $\propto$ " to express this "d $\propto$ n" are introduced. In the next example, we note that at a service station the cost of purchasing gasoline varies directly as the number of gallons bought, and again in plotting the corresponding values a line graph is obtained. A further example of direct variation is described. In a physics experiment weights are placed at the end of a spring suspended vertically. As different weights are added the length of the spring changes and the values are noted. The ordered pairs obtained in the experiment are then plotted and the resulting graph is discussed. In geometry, the relationship of the measure of the circumference to the measure of the diameter is examined. A mechanical device is used to determine this relationship. The program concludes with a brief summary of the notion of direct variation.

SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the terms variable, gram, centimeter, ratio, line graph, and the plotting of points is required in order to use the program to its fullest advantage. The following questions could be used as a preparation for telecast.

1. Review the following terms x-axis, y-axis, origin, ordered pair, table of values, plotting, straight line.
2. Discuss the following relationships:
   - the total cost of gasoline is related to the volume purchased,
   - the distance travelled in a car is related to the time elapsed,
   - the price of an airline ticket is related to the length of the trip.

   Determine other relationships and discuss their properties.
3. Discuss what is meant by a quantity which can be easily measured. Determine some quantities that are not easily measured e.g. the speed of the wind, amount of rain fall.
4. Discuss in what ways graphs are useful to man.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.
2. Discuss the use of direct variation in consumer purchasing.
3. Determine physical phenomena that can be directly related:
   - the length of a burning candle related to the time elapsed,
   - the height of water in a cylinder related to the time elapsed,
   - the length of a spring related to the weight in the pan.
4. The experiment seen on the program that relates the distance travelled by a

bicyclist to the number of turns of the foot pedal could be related to the experiment that relates the distance walked by a student to the number of steps taken. Compare the similarities and difference of the two situations. Will the graph for each student be the same?

5. Find other examples of direct variation that occur in mathematics
   - the circumference C of a circle varies directly as the diameter C Discuss the constant in $C = \pi d$,
   - the area A of a triangle varies directly, as the product of the base b and height, h. Discuss the constant in this case: $A = \frac{1}{2}$ bh.
6. Determine examples of relationships that do not involve direct variation.

PROGRAM 8

INVERSE VARIATION

The aim of the program is to introduce inverse variation by means of visual practical experiments and situations (Curriculum 1.12D, Unit 5, section 4, 5.)

TABLE CONTENT

The program begins with a reference to the nature of direct variation as seen in an earlier program. As the first example of inverse variation, a wall is to be constructed from a fixed number of bricks. The number of brick-layers, n, is increased and the time, t, required to build the wall is noted. For each corresponding value of n and t, the product, nt, is constant. The expression, n, varies inversely as, t, is introduced. As further example of inverse variation, a rectangular array of objects is examined. For each different array, the product of the number of columns, c, and the number of rows, r, is seen to be a constant. The ordered pairs denoted by (r, c) are plotted for this example and the graph is obtained. The relationship between the speed of a car, s, each time moving at a constant rate, and the time, t, required to travel a fixed distance is examined as a further example of inverse variation. From this example it is determined that t varies inversely as s. The values of 1/s are computed and it is found that $t \div 1/s$ is a constant. The notation $t \propto \frac{1}{s}$ is introduced for inverse variation.

The experiment to show Boyle's Law illustrates a further example of inverse variation. The experiment is simply presented. A knowledge of this law is necessary in scuba diving. Divers must know the pressure (depth of water) and the volume of air supply available. The program closes with a summary of inverse variation.

SUGGESTED PRE-VIEWING ACTIVITIES

Familiarity with the terms: direct variation, variable, ratio, reciprocal, is required in order to use the program to its fullest advantage. Some discussion on the question found in the post-viewing activities would also be helpful. Since there is no attempt to teach all aspects of inverse variation, the following could be used as a preparation for the telecast:

1. Review the following terms: x-axis, y-axis, origin, ordered pair, table of values, plotting, straight line graph.
2. Discuss the following relationships:
   - the intensity of light decreases as the distance from the source is increased,
   - the time taken to travel a certain trip is decreased as the speed of travel is increased.
3. Determine the total possible rectangular arrangements of a fixed number of objects (e.g. 36 objects).
4. Review the notion and direct variation, and the terminology d varies directly as n written as $d \propto n$.

SUGGESTED POST-VIEWING ACTIVITIES

1. Discuss points of interest in the program and clarify difficulties arising from it.
2. Determine physical phenomena that are inversely related, e.g. the intensity of a sound decreases as the distance from the source is increased.
3. The time taken to travel, a distance, d, miles varies inversely as the speed of travel. Discuss this experiment from the program. Find the change in time produced by doubling the speed.
4. Boyle's Law essentially states that the volume, V, of a gas varies inversely as the pressure, P, of the gas under conditions. Discuss this experiment on the program. If P is 10 when V is 5, find P when V is 24.
5. Compare direct and inverse variation.
6. Determine examples of inverse variation that occur in mathematics, etc.
   - the intensity of light varies inversely as the square of the distance from the source.
   - If the area of a triangle is constant, the base of the triangle varies inversely as the height.

MATHEMATICS – Intermediate Division
8 programs, 20 minutes each

Prog. No.	CBC 10:10-10:30	CBLT 10:10-10:30	CHCH 9:25-9:45	CKCO 9:30-9:50	CJOH	CBOT 9:55-10:15	CKLW 10:30-10:50
1	OCT. 25 – 9:30-9:50	OCT. 21	OCT. 28 – 9:40-10:00	OCT. 15 – 9:45-10:05	OCT. 28 – 9:20-9:40	OCT. 25	OCT. 22 – 10:45-11:05
2	NOV. 15 – 9:50-10:10 JAN. 17 – 9:40-10:00	NOV. 18 JAN. 13 – 10:00-10:20	NOV. 14 – 9:45-10:05	OCT. 29	NOV. 4 – 9:10-9:30	NOV. 1	NOV. 5
3	DEC. 6 – 9:50-10:10	DEC. 2	NOV. 28 – 9:45-10:05	NOV. 5	NOV. 25 – 9:15-9:35	NOV. 15	NOV. 12
4	DEC. 18 APR. 18	DEC. 16 APR. 21 – 9:40-10:00	DEC. 12 – 9:45-10:05 APR. 10	NOV. 19	DEC. 16 – 9:15-9:35	DEC. 6 – 9:50-10:10	NOV. 26
5	MAR. 5 MAR. 7	MAR. 3	MAR. 6	MAR. 11 – 10:10-10:30	JAN. 6 – 9:20-9:40	JAN. 17	MAR. 25 – 11:10-11:30
6	MAR. 26 – 9:45-10:05 MAR. 28	MAR. 31	MAR. 27	APR. 22	FEB. 10 – 9:40-10:00	FEB. 14 – 10:00-10:20	APR. 29
7	MAY 2 – 9:50-10:10 MAY 9 – 9:50-10:10	MAY 12 – 9:40-10:00	MAY 1	MAY 13	MAR. 10 – 9:20-9:40	MAR. 7 – 10:00-10:20	MAY 20 MAY 26 – 10:40-11:00
8	MAY 23 – 9:30-9:50	MAY 26 – 9:40-10:00	MAY 8	MAY 27	APR. 21 – 9:10-9:30	MAR. 28 – 10:00-10:20	JUNE 3

MATHEMATICS - INTERMEDIATE DIVISION